# MODIS TECHNICAL TEAM MEETING

## Building 33, Room E125
## August 3, 2000

Vince Salomonson chaired the MODIS Technical Team Meeting.  Present were Bruce Guenther, Bruce Ramsay, Mark Domen, Bob Murphy, Ed Masuoka, John Barker, Barbara Conboy, Michael King, and Steve Kempler, with David Herring taking the minutes.

## 1.0 SCHEDULE OF EVENTS

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| • SWAMP Meeting<br>  U. of Toronto, Canada | September 6-7, 2000 |
| • EOS/SPIE Symposium on Remote Sensing<br>  Barcelona, Spain | September 25-29, 2000 |
| • SPIE's Remote Sensing Japan 2000<br>  Sendai, Japan | October 9-12, 2000 |
| • VENICE-2000 (Oceans from Space)<br>  Venice, Italy | October 9-13, 2000 |
| • Ocean Optics XV<br>  Monaco | October 16-20, 2000 |
| • PORSEC 2000<br>  Goa, India | December 5-8, 2000 |
| • AGU Fall Meeting<br>  San Francisco, CA | December 15-19, 2000 |
| • Aqua Launch | December 21, 2000 |

## 2.0 MINUTES OF THE MEETING

### 2.1 MCST Reports
Guenther reported that the Terra MODIS instrument's focal plane temperature will be raised to 85K tomorrow (8/4/00).  MCST will also run some elevated blackbody temperature sequences.  Guenther said this change should have been made sooner.

Salomonson asked if the instrument has ice on its optics, how do we get it off?  Guenther said he hopes it doesn't have ice on the optics.  He sees no evidence in the data that suggests there is.  To be sure, he asked Wayne Esaias to compare MODIS' sea surface temperature measurements with those of AVHRR in two one-month periods to see if there is any spectral signature of ice.  Guenther said there is ice on the radiative cooler, which is different from ice on window.  On Monday, MCST will elevate the temperature on the cooler to 318K and keep it at that temperature for 48 hours to melt the ice and outgas the water vapor.  Salomonson asked if there is any chance there will be a change in the

instrument's configuration when we cool it back down. Perhaps, responded Guenther, but that risk is negligible when compared to the effects of not doing it.

In mid-August MCST will install new Level 1B code, updating the calibration software in the processing system to Version 2.4.3. He sent an e-mail to the Science Team members describing the improvements in the lookup tables and improvements to the code. Briefly, MCST corrected the optical leak problem from Band 31 into Bands 32-36. He said, previously, MCST was overcorrecting and found images of "ghosts" from Band 31. MCST is also adding improved infrared response versus scan angle table corrections and installing non-linear calibration coefficients into the code for the MWIR bands.

Salomonson asked about the boards for the gain change on the Aqua MODIS instrument. Domen said everything is now in place to start assembling spare boards for the gain change using 340K as the saturation temperature. Salomonson asked if 200 DN at space view will be set as the lower limit. Domen responded affirmatively, stating that the paperwork for the change is now complete. He said it will take about 8 weeks to build and test the new boards.

Domen reported that, this week at TRW, Aqua Project personnel did their first comprehensive performance test of the MODIS instrument since December 1999. Specifically, the team performed electronic and spatial calibration tests. The results were very good; they were in line with the previous test results from December. He noted that the Aqua Project doesn't yet have approval from Ghassem Asrar to pull the boards off MODIS for adjustment. However, he said, there will not be time available on schedule to do so until end of August. At the end of August, there will be a short window of opportunity for making the change at TRW, but if the team misses that window, he cautioned, there will likely not be another opportunity. Domen said the requirement is for the change to be completed before thermal vacuum testing, which starts in October. So, the Aqua Project has about 4 weeks of activity in which to pull cards, make modifications, and test and reinstall the cards before thermal vacuum testing.

Salomonson suggested that if there is some conflict on the schedule, the Aqua Project should go to explain the situation to Ghassem Asrar so he can provide some further guidance as he sees appropriate. He asked where the team stands with respect to Paul Westmeyer's recommendation on whether to switch to the B-side electronics on the Terra MODIS. Guenther responded that as a result of Salomonson's meeting with Chris Scolese and Paul Ondrus, the latter are producing a list of questions for clarification on some issues. For instance, contingency plans for data processing is one of the issues. The list of questions has not been asked yet, but when those questions are answered, then presumably the switch to B-side can be made. Barker said he has no recommendation to make on the subject yet; he is still gathering and reviewing information.

## 2.2 Atmosphere Group Report

King reported that he is quite excited about MODIS' atmosphere data product results and he is eager to release data products to the public. The first major upgrade to King's algorithm has been completed. There are some fixes to the

code that are being implemented.  King's intent is that once MODAPS is producing, then he would like to proceed with promoting the data products in the DAAC as ready for the general public to see.  He expects the products to be ready fairly close to the original schedule that was published in *The Earth Observer* newsletter.

King said Menzel's cloud top properties data product also looks good.  Gao's cirrus cloud product is probably the least ready.  King said his time will be heavily committed in the SAFARI campaign soon, so he wants to begin implementing fixes now.  Murphy asked King to determine when Gao will be ready to release the cirrus product.

King announced that the *EOS Data Product Handbook, Vol. II* is nearly finished. The new volume includes data product descriptions for Aqua, Landsat 7, QuickTOMS, ACRIM, SeaWinds, SAGE III, and Jason-1.  He acknowledged Claire Parkinson for updating the handbook; she spent a lot of her time writing and editing the new volume.  King noted that all MODIS Atmosphere Group data products have sample images with the descriptions.  There is also a revised flow diagram for Atmosphere products, including ancillary and input files. Another new feature the handbook provides is basic product information, such as maximum file size, number of granules per time interval, and Web site locations for quick looks and product information (e.g., MODIS Atmosphere Web page), etc.  King said a lot of work went into the new handbook and he feels it is much better than Volume I.  Once this volume goes to print (in August), his office will begin work on updating Volume I.  Since MODIS and CERES will have been recently completed for Volume II, there will be no further work required of these two teams.  Volume I will include Terra, TRMM, and DAO, as in the past.

Salomonson asked if there are any specific plans for special issues on Terra science results.  Salomonson said special issues are a good way of publishing MODIS' new results.

**2.3 GDAAC Reports**
Kempler announced that the GDAAC distributed MODIS processing software to 25 different MODIS Direct Broadcast receiving stations.  He noted that Aqua will be coming on line soon so we need to get the PGEs (Product Generation Executables) ready for Aqua MODIS Direct Broadcast.  Kempler said he is also getting requests for higher level software as well.  The GDAAC is awaiting specific instructions and guidelines on software copyright issues before it distributes higher level software.  King commented that intellectual rights to software is sometimes a contentious issue and the resolution of such issues is often difficult.  Domen suggested that there may be ways to obtain agreements that alleviate some of the issues involved.  Salomonson said that he would work with relevant parties to explore what is involved.

Kempler reported that EDOS is providing Level 0 data to the GDAAC again.  He said a "slew of tapes" have arrived as part of the data backlog.  The GDAAC is

currently running about 80 hours behind leading edge on processing, and is working now on catching up.

Guenther pointed out that MCST is taking MODIS off-line for 5 days, from Aug. 7-12, to recondition the radiative cooler.  The timing of the reconditioning is set in order to have MODIS operational again before the beginning of SAFARI.  The week-long absence of MODIS data should help the GDAAC catch up on some reprocessing.

Murphy asked Kempler about data days 178-180; did they get erased?  He said EDOS has to recycle tapes and after 30 days they become vulnerable.  He is concerned that the data from days 178-180 must be archived before those tapes are recycled.

Salomonson asked when will the MODIS Team get continuous week-long data?  Masuoka said he expects that to happen by mid-August.

Kempler told the Team that EDOS is now checking MODIS data before passing them to the GDAAC for processing.  Hopefully, this will eliminate some problems on the processing end.

### 2.4 SDST Updates

Masuoka said Yoram Kaufman requested for someone to look at the entire data processing system from end-to-end to look for ways to troubleshoot, optimize, and improve performance.  Richard Ho will be that someone.  Masuoka said he would work with Ho on Terra MODIS and someone elso will work with Ho on Aqua MODIS.  Masuoka is preparing a viewgraph on that activity.

Regarding version 2.4.3 of the Level 1B processing software, Masuoka reported there's a new look-up table coming (see Attachment 1).  He said it will be ready around Aug. 13-15.

Regarding reprocessing, nominally, since SDST works on 8- and 16-day periods, Masuoka plans to pull in chunks of data for reprocessing in those same time steps.

### 2.5 NOAA Reports

Ramsay showed a viewgraph of outlining how NASA and NOAA are cooperating on the use of MODIS data.  There is a data communication line between Goddard and Suitland, but that is incapable of sending the data stream in any really usable rate.  (The current link is a combination of T1 lines.)  He said NOAA is working two parallel paths to resolving that problem. NOAA is processing MODIS data to Level 1 at GSFC.  They are currently processing only data over North America in a timely manner, and are hoping to achieve a 3-hour turnaround time for NCEP.  NOAA uses the same PGE's that the GDAAC uses.

Ramsay said an informal NOAA MODIS Science Team is being formed to ensure that all personnel within NOAA are talking and sharing information.  There will be product oversight panels that are discipline focused.  The idea is to target one

person from each oversight panel to ensure there is cross fertilization in terms of using data and new science results.

## 2.6 MAST Updates
Conboy said the framed and matted MODIS images are ready to present as gifts for HQ and Project folks.

Murphy stated that, in preparation for the upcoming Aqua Science Team Meeting, the issue of cross validation between MODIS and AIRS has come up. George Morrow and Murphy talked about some of the issues.

# 3.0 ACTION ITEMS

## 3.1 New Action Items
1. Masuoka and Conboy:  Work with Patent Counsel, Legal, and Procurement to resolve issues concerning MODIS Science Team Member software distribution.

## 3.2 Action Items Carried Forward

1. Esaias:  Prepare a group of charts for the next MODIS Technical Team meeting that delineates the relevant issues related to the Band 31/32 gain change and the recommendation that Tmax should be set at 340K for both bands.

2. Guenther: Circulate recommendation to Discipline Leaders on plans to flag and fill dead detectors.  Responses from Discipline Leads are needed by this time next week.

3. MODIS Science Team: Send updates on MODIS metadata terms/valids to Skip Reber (reber@skip.gsfc.nasa.gov).  These are terms that enable users to search MODIS data.  This is part of a request to the Terra Instrument teams to update metadata terms.

Status: This action is open.

4. Discipline Leads: Send feedback to Murphy and Guenther on setting flags for dead (non-functional) detectors while they are set to zero.  Currently, MCST would like MODIS Science users to provide feedback on which detectors are dead.

Status: This action is open.

5. Discipline Leads: Send MODIS Data Product table updates to Reber with a copy to Murphy.  The MODIS Data Products table is on the Web at:
http://eosdatainfo.gsfc.nasa.gov/eosdata/terra/modis/modis_dataprod.html

Status: This action is open.

6. Masuoka: Submit an EOS-PM Data Product Update to ESDIS.

Status: This action item remains open.

7. Vermote: Remove password protection from MODLAND graphic that displays gaps in MODIS data.

Status: This action items remains open.

8. Masuoka: Represent MODIS concerns on data throughput to EDOS.

Status: This action items remains open.


## 4.0  ATTACHMENTS

Attachment 1 – Memo from Bruce Guenther, MCST leader:

I prefer that the new L1B version (V 2.4.3), delivered over the past several days, beginning in late July, NOT be installed in DAAC production until a new set of Look-Up Tables (LUTs) are provided. I hope to get the appropriate set of LUTs to Jim Rogers by Wednesday, and he expects that those LUTS can be provided for the DAAC before the following Friday (11 August).  Once the new L1B code (V 2.4.3) is promoted to production processing with the appropriate LUTs, this code can be run at any time (i.e. it does not need to be held to start for processing beginning at any specific date).

The primary fixes in the LUTS are:
1.      Installation of an improved LUT for the optical leak cross-talk from Band 31 into Bands 32 -- 36.

2.      Improved RVS values in the TEB (Bands 20 - 36, ex. 26) to minimize mirror-sidedness and channel-to-channel differences. [This fix is based on analysis of Closed-Nadir Aperture Door data, but it does not provide, necessarily, any improvements in capturing the actual Terra-MODIS RVS behavior in the LUT.  The intent is to provide an L1B product for validation for which the scientist need not track which mirror side, or which detector actually was used in comparison to their validation data.  With the improvement, it still will be necessary for the scientist to track scan angle or angle of incidence in their validation of the L1B product.  MCST expects that further improvements will be needed in our RVS LUTs at some time in the future.  These improvements may come from either a direct RVS measurement through a Terra deep-space maneuver, or from L1B/L2 data product validation studies.]

3.      The first operational installation of a non-linear calibration for the MWIR bands (20 - 25) will be made.  [The U. of Miami has used these values for the 4-micron SST bands and found them to be helpful in the reduction of image striping, particularly for radiances away from the temperature of the OBC-blackbody, about 293 K].

4.     We will install improved linear gain values for band 21 from on-orbit 315 K OBC-blackbody operation and from looks at moon-in-space-view-port.  [These values will not be as good as we would like for instances where the Band 21 focal plane is not controlled at 83 K.  These values will be useful if the radiative cooler outgas procedure form 7-12 August is successful and we can return to a controlled 83 K operation.]

5.     We continue to develop improved channel-to-channel linear gain calibrations using recent moon in the space view data for the reflected solar bands, Bands 1 - 19, + 26.  [This improvement is intended mainly for those bands where we must have in place the solar diffuser  (SD) attenuation screen for obtaining on-orbit calibration with the SD.  The attenuation pattern of this screen in difficult to interpret and we believe that we cannot achieve channel-to-channel uniformity for these bands to any better than perhaps 1% residual differences. These improved linear gains mainly will impact Bands 8 - 16.  At the present time MCST is not certain that this LUT update will be ready for delivery at the time of the first operational use of this new L1B version.

Items 1-4 above will be included.  Item 5 still is underdevelopment and inclusion of this LUT is not guaranteed at this time.

The primary fixes/enhancements in the code are:
1.     The logic for invalid values of "Scan quality array" was changed. Previously, an invalid value of Scan quality array would result in an error exit (the whole granule was lost).  Now, if an invalid value is encountered, the scan is treated as missing and the rest of the scans of the granule are processed normally.

2.     A logic error in Preprocess was corrected for saving the value of  Band 31 dn_bb values.  Previously, the value from the wrong scan and detector was being used for the PC bands cross-talk correction algorithm.  Since the values are fairly stable from detector to detector and scan to scan, there will only be a small change in the Emissive bands.  In a representative test case, the maximum change was about 0.5%.

3.     Non-functioning detector flag has been implemented in this code.  For non-functioning detectors, a linear average of adjacent (in track) values are constructed and supplied as an artificial value.  This strategy has been selected to facilitate easy construction of images of L1B band radiance at this time.  Users of the product may identify scan lines that are affected by looking at the product attribute "Dead Detector List".

4.     The LUT ingest architecture was changed to incorporate data-collection-time-dependent LUTs.  The LUT file architectures were changed such that scalar, numerical LUTs implemented as global attributes were changed to be SDSs. There were several such changes in each LUT HDF file.  When the values of the LUTs remain the same, there are no changes in the output products.

All code enhancements are included in this delivery.

Note to Mike Teague:  Item 3 in the LUTs in my mind is the one that most likely Miami was pointing to when they indicated in yesterday's PIP telecon that they have tested the fix and like it for improved striping in their SST products.